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ABSTRACT

This is the first program in the Science Safari series produced by the Fairfax Network of the Fairfax County Public Schools. The series and the accompanying print materials are designed to show students a broad spectrum of animal life, introduce students to a variety of people who work with animals, and help students become aware of the important role they play in the future of the animal kingdom. Activities related to beaks and feet, hunting for food, migration headaches, destination Mexico, colors of migration, and pre- and post-viewing activities are included. Lists of research projects and resources are also included. (JRH)

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Fairfax County Public Schools

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ED 388 526

In a Word...It's a Bird.

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"In a Word...It's a Bird"

is the first program in the
Science Safari series, a production of
the Fairfax Network of the
Fairfax County Public Schools

in cooperation with:

Smithsonian Institution
National Zoological Park
Conservation and Research Center
(Front Royal, VA)
Smithsonian Migratory Bird Center

with assistance from:
British Airways
Friends of the National Zoo
Howard Hughes Medical Institute
Smithsonian Outreach Fund

with support from:

MEXICO

Mexico Ministry of Tourism

Hello and welcome to "Science Safari." We hope you and your students will enjoy our look at a variety of animals and the people who work with them. Throughout the four shows, students will learn about birds, herd animals, animals native to America, and some animal giants. They'll meet the experts who study and care for these animals. During each show there will be five main segments. The first segment will be a brief overview of the show's topic, followed by a segment on several scientists who work with animals. Next, we'll focus in on the animals, and then we'll discuss some of the research and technology that scientists are using to find out more about these animals. Finally, we'll look at the animals from a historical perspective. Throughout the show, anecdotes and short segments will present information about the animals in a humorous way.

Again, welcome to "Science Safari." We're glad you and your students are joining us on our tour of the animal kingdom.

Series Objectives:

The series and the accompanying print materials are designed to:

- Show students a broad spectrum of animal life.
- Introduce students to a variety of people who work with animals.
- Help students become aware of the important role they play in the future of the animal kingdom.

WHAT IS A BIRD?

You probably know what a bird looks like, but there may be a few things you don't know about birds that might surprise you.

- There is not a single kind of bird existing today that has teeth. Without teeth, birds use their bills for preening (cleaning) their feathers, catching prey, and eating food.

- Birds are vertebrates (animals with backbones) and are the only vertebrates that have feathers. Feathers perform three important jobs for birds. They control body temperature, make it possible for birds to fly, and have colors that are used for communication with other birds and for camouflage from enemies.

- The total weight of a bird's feathers is usually more than the weight of its skeleton. Many birds have thousands of feathers—a swan can have as many as 25,000.

- There are different kinds of feathers. Flight feathers, on the wing, provide lift for flight. Outer contour feathers cover the bird's body and head, shed moisture, and are the most colorful. Down feathers are fluffy and trap air used for insulation to help keep a bird's body temperature steady.

- Not all birds fly. Some, like emus and penguins, are completely flightless.

- You probably know that birds lay eggs. Do you know which birds lay the biggest eggs and which lay the smallest eggs? The ostrich produces the largest egg, weighing 4 pounds. The hummingbird lays the smallest eggs at 1/50th of an ounce each.

- You probably also know that many birds make nests. The size of a nest, where the bird makes it, and the bird's building materials all change from bird to bird. These factors depend on the environment the bird lives in and what materials are available. You won't see too many trees in the Antarctic, so what do you think penguins build their nests with? Pebbles! Some birds, like the cow bird, lay eggs in other birds' nests.

- Many birds fly great distances every year during migration. The Arctic tern has one of the longest trips; it flies from the Arctic to

the Antarctic and back again every year. That is a round trip of 25,000 miles!

- One of the current hypotheses about bird evolution is that birds evolved from dinosaurs. Many scientists believe that birds are the only living descendants of the dinosaur.

- The color of a bird's feathers (plumage) serves many different purposes. Plumage color varies greatly between birds. Many male birds, and some female birds, are very colorful—this serves to attract mates or to scare off enemies. Some birds' plumage allows them to blend into the background, which keeps them hidden from predators. This is called cryptic coloration.

PREVIEWING ACTIVITIES:

You can help your students prior to the program by using any or all of the following activities:

1. Create a list of key words and definitions with students that they feel may be related to the topic of the program (For example, plumage, migration, preening, molt, contour feathers, feathers, crop, gizzard, territory).

2. Give each student a copy of the What I Know, What I Want to Know, What I Learned (KWL) chart on page 5. Direct students to brainstorm what they already know about birds, and write that information in the "What I Know" column. Ask students to complete the "What I Want to Know" column. Collect the students' charts. (The third column will be completed after viewing the program.)

3. Direct students to bring in articles from newspapers or magazines that are related to birds and bird issues. (For example, the removal of the bald eagle from the endangered species list.)

4. Direct students to brainstorm all the things they think birds have in common. (After the program they will discover the three things all birds share: all birds are warmblooded, all birds have wings, and all birds have feathers.)

5. Ask students to write stories about favorite birds or about experiences they may have had with a bird.

6. Discuss bird-watching as a hobby.

   a. Why is it so popular?

   b. What equipment might a bird watcher need? (pencil, notebook, bird field guide, binoculars, camera, or art materials)

   c. What are the qualities a good bird watcher must have? (an interest in birds, a keen eye, patience)

   d. How does the time of day or the time of year affect bird watching?

7. Ask students to write about some "bird expressions." ("bird-brained," "eat like a bird," "light as a feather," "happy as a lark," "wise as an owl," "mad as a wet hen," "like water off a duck's back," "birds of a feather flock together")

8. Read Jerry Palotta's book The Bird Alphabet Book. Direct each student to create a "Birds, A to Z" book using research materials to locate birds or bird-related words for his or her alphabet book.

KWL CHART

BIRDS

What I Know	What I Want to Know	What I Learned

BEAKS:

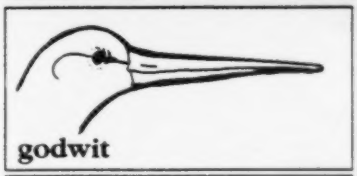
Did you know?

We can tell a lot about birds by their beaks and their feet. They use their beaks to build nests, to preen, and to defend themselves. They also use their beaks in finding, catching, and picking up food. They use their feet to get them around when they are not flying. Birds also use their feet to help catch and pick up food.

MATCH!

Try to match the beaks to the type of food. Then try to match the feet to what they might be used for

BEAKS



godwit

crossbill

cardinal

hummingbird

flamingo

pelican

eagle

fish

seeds

small shrimp

marine

worms

flowers

pine cones

small animals

ANSWERS:
BEAKS:
A godwit eats marine worms
it finds in the sand.
A crossbill eats seeds it can
get out of pine cones.
A cardinal eats seeds.
A hummingbird eats nectar
from flowers.
A flamingo eats small shrimp
it can filter out from water.
An eagle eats small to
medium animals.
A pelican eats fish that it can
hold in the pouch under
its beak.

10

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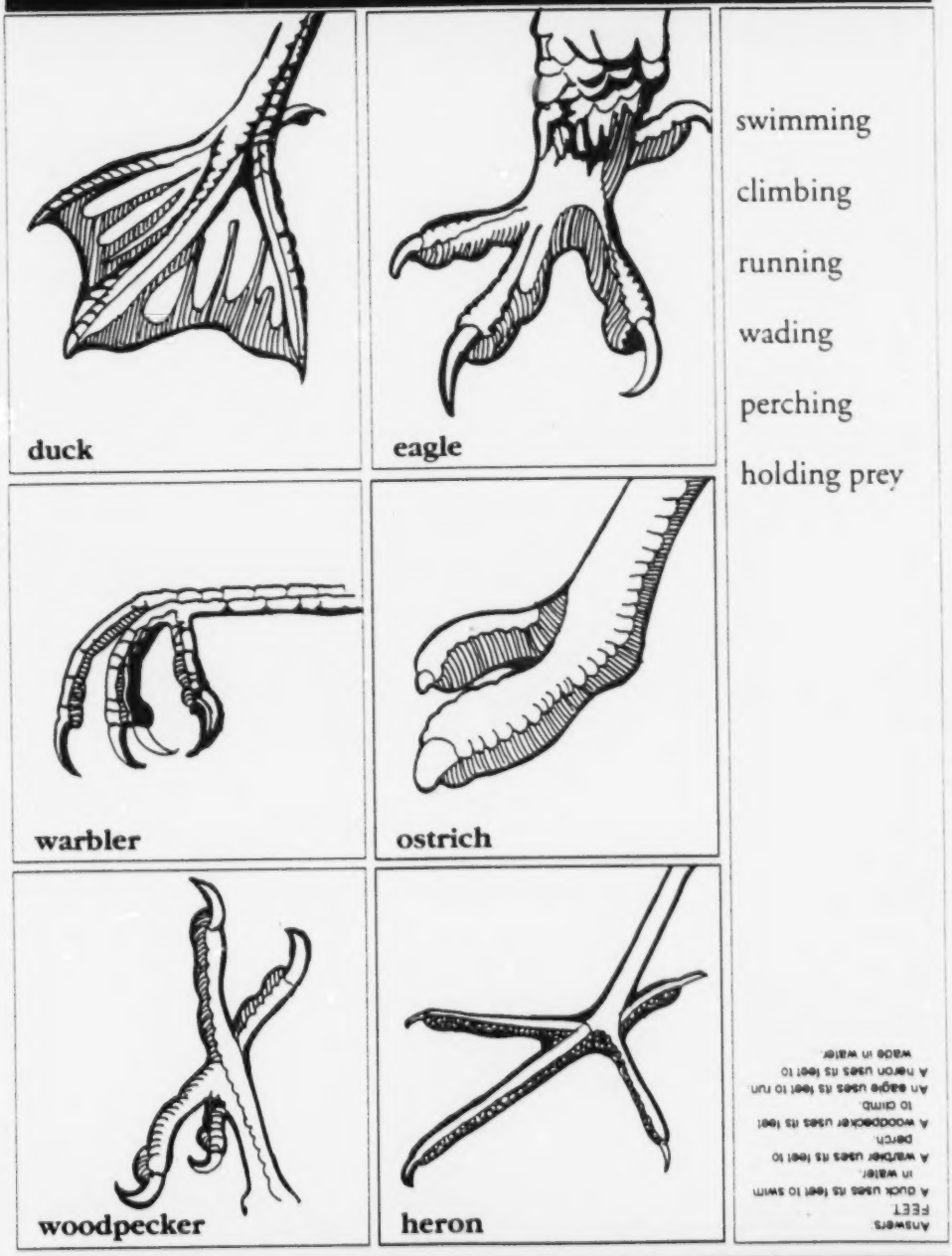
FEET:



Answers:
FEET
A duck uses its feet to swim in water.
A warbler uses its feet to perch.
A woodpecker uses its feet to climb.
An eagle uses its feet to run.
A heron uses its feet to wade in water.

HUNTING FOR FOOD:

Did you know?

1. Birds have much sharper eyesight than do people. You and I can go to the supermarket and easily pick our food from the shelves. Birds, however, have to search for their food in the wild and need keen eyesight to spot their potential food. If their food is a worm, that worm will try as hard as it can not to get caught. Imagine trying to find a small squiggly worm from 8 feet in the air with only one glance! You can see that finding food is not easy. The prey have many ways of avoiding detection. One way is to try to blend into their surroundings. That worm can avoid being caught if it is camouflaged so that birds have a difficult time seeing it. But the birds might be eaten if they spend too much time in one area looking for that worm! Birds have to be able to spot their food and grab it fast.

2. Birds can see up to 3 times better than we can! Some scientists believe that their color vision maybe better than ours too!

Note to teachers: You will need pipe cleaners (cut into thirds) and an open area to do this activity. Try to use pipe cleaners that match the background of the area. For example, if you are in a field, use brown pipe cleaners and place them in the grass.

Here is your chance to be a bird! Scatter pipe cleaners in a field or open area. You can pretend they are worms! Start at one end of the field and race to the other side. Try and swoop down on them like a bird and snatch them up. But be fast! The first one to the finish line with the most worms wins!

Now, think about these questions:

1. Were you able to see the worms easily? Did they blend in with the background?

2. How far away were you from the worm before you saw it? Five feet? Twenty feet?

3. Were you fast enough, or did another bird get your worm?

HUNTING FOR FOOD:

ACTIVITY: Bird and Worms

OBJECTIVE: To introduce students to the role camouflage plays in a bird's ability to locate food.

Materials:

colored pipe cleaners cut into thirds
large playing field

Procedure:

1. Direct students to twist the pipe cleaners into "worms" and to scatter the worms over the playing field.

2. Divide students into five groups. Assign each group the name of a bird. (If possible, use names of birds that eat worms.)

3. As you call the name of a bird, students in that group "fly" across the field and pick up the first worm they can find. The worms are to be laid in a line after each "flyover."

4. When all the worms have been found, discuss the color sequence of the worms found to see if there are any trends or patterns. Use this information to discuss how camouflage protects prey from their predators.

MIGRATION HEADACHES:

Objective: To acquaint students with some of the problems caused by humans that affect migratory birds.

Note to teachers: This activity can be used with any age group. With older students, you can play a few rounds of the waterfowl version and then ask them to become songbirds and play the songbird version, with discussion following. For younger students, provide discussion after each segment.

Materials:

"habitat" markers made of scrap materials (two for every three students)
red stickers
green stickers

Procedure:

1. Cut six circular (1" diameter) "habitat" markers from foam meat trays or heavy cardboard. Put a red sticker in the middle of about one-fourth of them and a green sticker on each of the others (just on one side).
2. Scatter half of the markers at the south end of the playing area and half at the north end, with the sticker side down.
3. Ask students to form groups of three per marker at the north end of the playing area and explain that they are to be waterfowl who will migrate to and from their wintering grounds in the south. Direct each group to choose a specific species and identify specific geographic destinations. In each group, one student is to imagine being an "egg," indicating his or her status by arching his arms over his head, with hands clasped. If you play the game in the fall, you may want the game to begin in the south.
4. After pointing out the markers at the south end of the playing area, remind students to walk, not run, flapping their arms as they "fly." Point out that all birds must land when they reach their wintering grounds in the south, but that no more than three birds can occupy (by stepping on the edge of a marker with one foot) the area represented by each habitat marker. Direct all the "eggs" to "hatch" and then give all of the birds the signal to "fly south!"
5. When all birds have arrived in the south, announce, "Well, the good news is that all of you have arrived safely. The bad news is that illegal hunting is occurring in some areas. Check your marker for a red sticker, which will indicate whether or not you have survived."

6. Direct all "dead birds" to stand on the sidelines, but assure them that they may re-enter the game as eggs in the future. Give the survivors the signal to "fly north!"

7. When all birds have arrived in the north, announce, "Well, the good news is that all of you have arrived safely. The bad news is that some areas have been partially drained and are not suitable bird habitat. Check your marker for a red sticker to indicate that you will not survive." Direct all "dead birds" to move to the sidelines. At this point, all students who are on the sidelines may join the others as "eggs," indicating their status by arching their arms over their heads, with hands clasped. After all eggs "hatch," give all the survivors the signal to "fly south!"

8. When all birds have arrived in the south, announce, "Well, the good news is that all of you have arrived safely. The bad news is that some areas are still contaminated with toxic lead shot, even though lead shot is now illegal. Check you marker for a red sticker to indicate that you will not survive." Direct all "dead birds" to stand on the sidelines. Give the survivors the signal to "fly north!"

9. When all birds have arrived in the north, direct all students who are on the sidelines to join the others as "eggs," indicating their status by arching their arms over their heads, with hands clasped. Announce, "Well, the good news is that all of you have arrived safely. The bad news is that some areas have been affected by an oil spill that will lead to the death of all eggs and adult birds in these areas. Check your marker for a red sticker to indicate that you will not survive." Direct all "dead birds" and "eggs" to stand on the sidelines. After the surviving eggs "hatch," give all the survivors the signal to "fly south!"

10. Continue the game as long as you wish, selecting both positive and negative reasonable events such as habitat restoration (positive) and such as drought (negative).

(NOTE: In the original Project WILD activity, the directions suggested that habitat markers be removed or added, or that some be turned to the reverse side between rounds. In my experience, it adds drama for all birds to land safely and then hear the "bad news" and have to check their markers for red stickers. Also, changing the numbers of red-coded markers after each round is not really necessary because students end up pretty randomly distributed and seldom can remember which markers to avoid. Following a decrease in population size, the survivors may by random chance survive or die at the next round in frequencies that are quite different from the frequency of red-coded markers.)

This activity is adapted from an activity written by Mary V. Ball, Center for Education Services to Appalachia, in The Migratory Bird Handbook, compiled and edited by Jamie Doyle.

DESTINATION MEXICO:

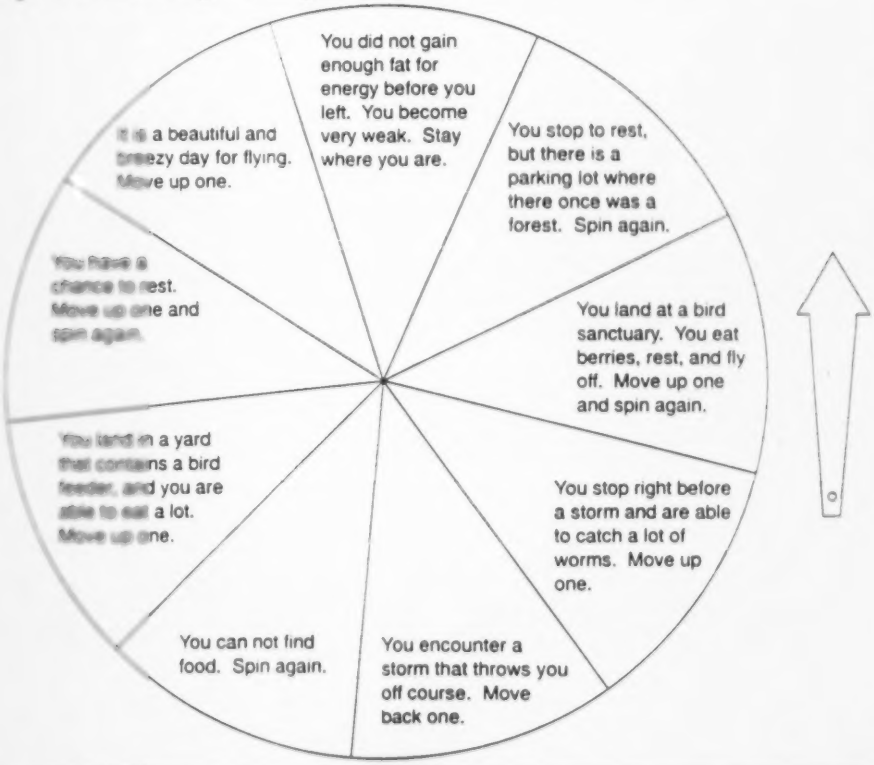
Did You Know?

1. Each year, billions of birds migrate to Mexico or through Mexico on the way to Central America and South America!! Why? There are several different reasons birds migrate. One of these reasons is because as winter approaches the days get shorter and shorter, and food begins to get scarce.

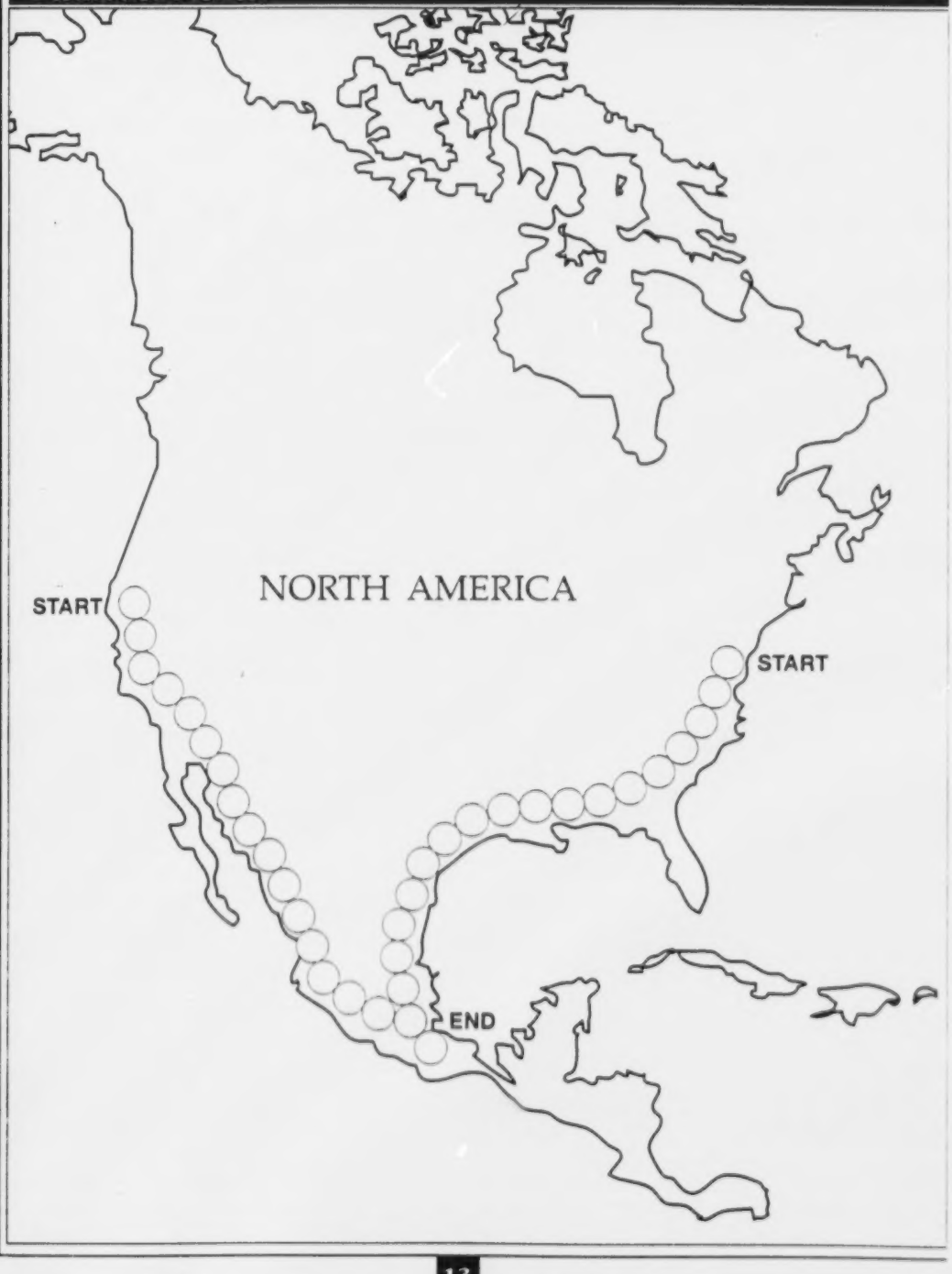
2. How do you think a bird finds it way from North Ameica to Mexico? Scientists have done migratory experiments for over 30 years and have shown that birds use numerous types of cues to navigate from one place to another. Some of these are the sun and the Earth's magnetic fields. Most night-migrating birds use stars to follow a migration route and probably use specific landmarks to find particular territories. Some birds migrate to the exact place at which they were the year before!

Let's Fly!

Imagine you are a bird and have to fly from North America all the way to Mexico! Spin the wheel and see who can reach Mexico the fastest! Everyone begins at "start." Each player takes turns spinning to see how far he or she can move up or back along the migration path.


You did not gain enough fat for energy before you left. You become very weak. Stay where you are.
You stop to rest, but there is a parking lot where there once was a forest. Spin again.
You land at a bird sanctuary. You eat berries, rest, and fly off. Move up one and spin again.
You stop right before a storm and are able to catch a lot of worms. Move up one.
You encounter a storm that throws you off course. Move back one.
You can not find food. Spin again.
You land in a yard that contains a bird feeder, and you are able to eat a lot. Move up one.
You have a chance to rest. Move up one and spin again.
It is a beautiful and breezy day for flying. Move up one.

Destination Mexico:



COLORS OF MIGRATION:

Splashes of indigo blue, deep purple, vibrant red, bright green, and startling orange fill the skies during the spring and summer months. Migratory birds arrive with the first spring caterpillars. When we are thinking of urban animals, it is important not to forget the beautiful array of birds that grace our city. Some of these birds live here all year long. Others migrate here during the spring and summer. We call their travel to this area "migration" because they fly together in large groups, moving from place to place seasonally. Many of these birds bring us beautiful splashes of bright color such as the Indigo Bunting, the Scarlet Tanager, Purple Martins, Ruby-Throated Hummingbirds, the Rose-breasted Grosbeak, and the Baltimore Oriole.

1. Why do birds migrate? What causes them to travel across an ocean and face the perils of frigid temperatures and treacherous storms?
2. Think about the basics for survival that you need (food, shelter, and water). These are also the needs of all animals. The birds we are focusing on are called "neotropical migrants." Neotropical means the areas of South America and Central America near the equator with a tropical climate. "Migrants" simply indicates that the group travels from place to place to get what they need. They travel from Central America and South America to North America in the springtime and back again to Central America and South America before winter hits our fair cities. Once again, we ask why. The place they are leaving is not cold. Therefore, they are not leaving for shelter.
3. The simple answer is that they are searching for food. During the spring and summer, there is, in the Neotropics, a shortage of insect prey. The days are also shorter there during these months, compared to days in North America, allowing for less daylight in which to hunt for those much-needed insects. In North America during the spring and summer, there is an abundance of insects to give the birds their necessary sustenance.

This activity was adapted from Capital Critter Project written by Grace Sammon, Barbara McCoy, and Louisa Sheldon. Used with the permission of the Anacostia Project, District of Columbia Public Schools, Director, Howard Brown.

Colors of Migration:

BIRD WATCHING:

Observing means watching carefully. Data collecting means writing down the activities you see happening as you observe. You write down only the actions or facts—not feelings, thoughts, or emotions. For example, if you were observing someone who seemed sad, you might write, "the corners of her lips curved down, her head was bowed, she had tears in her eyes." You would not write "she looked sad!" She might have been peeling an onion, or she might have hurt herself! OBSERVATION is looking at ACTUAL OCCURRENCES.

At the zoo, people observe animals to learn about their habits. Watching is an important tool. If an animal is not eating enough, it might mean it is sick. So, it is important to watch and observe, because animals cannot tell us how they feel.

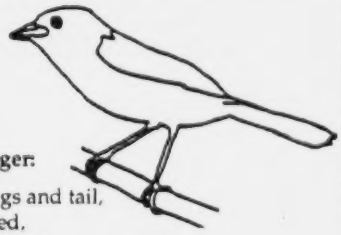
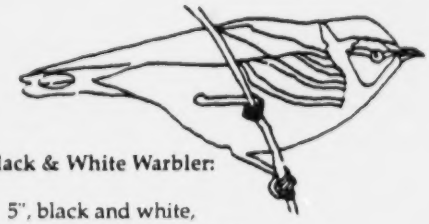
Scientists at the National Zoological Park often travel to other continents, such as Africa and South America, to observe animals in their natural habitat. That is how they learn more about the ways animals socialize, what types of food they eat, their behaviors and their needs for shelter. The scientists who do this work are called animal behaviorists.

Here at home, birds are a perfect animal to observe because many are awake in the day and are usually very active! Use the checklist on the next page to record your observations of the birds in your community.

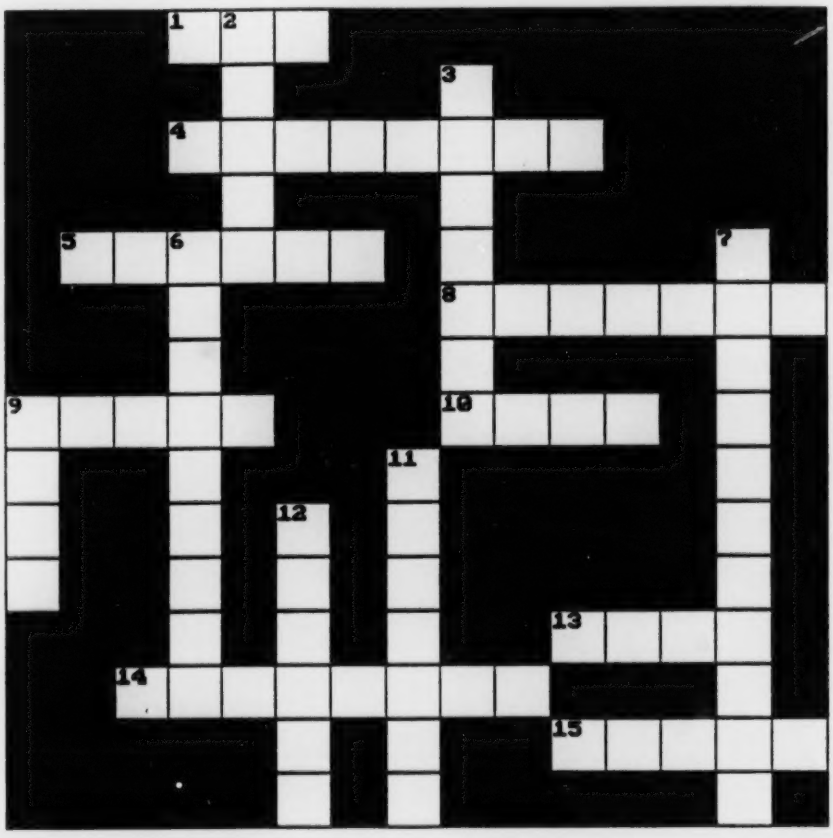
Colors of Migration:

NEOTROPICAL BIRD CHECKLIST

Go to a quiet location, look around, and see if you find any of the birds pictured below. If you do, write down the information listed in the chart below. If you like this activity you could become an official bird watcher through the Audubon Society.

Type of Bird	Date Sighted	Location
Ruby-Throated Hummingbird: tiny, only 3.5" in length, can fly backwards, brightly colored	Observations:	
Baltimore Oriole: 7.5", ♂ brilliant orange, ♀ dull orange, both with black wings	Observations:	
 **Scarlet Tanager:** black wings and tail, ♂ brilliant red, ♀ dull yellow-red	Observations:	
 **Black & White Warbler:** 5", black and white, ♀ and young, black throats	Observations:	

WORDS ABOUT BIRDS



ACROSS

1 Laid in bird's nest
4 A bird's covering
5 The weaverbird builds its nest from plant ____
8 Lays its eggs in other birds' nests
9 Toucan, kiwi, macaw, puffin
10 Some are made out of mud, twigs, or grasses
13 Some eggs are this shape
14 A baby bird before it leaves its nest
15 Birds have two of these

DOWN

2 More than one goose
3 Has webbed-feet and a bill to catch fish
6 The national bird (2 words)
7 The scientific study of birds
9 All birds have one
11 This bird does not fly
12 The eggs in a nest

Answers:
ACROSS: 1 egg 4 feathers 5 fibers 8 cowbird 9 birds 10 nest 13 oval 14 nestling 15 wings
DOWN: 2 geese 3 pelican 6 bald eagle 7 ornithology 9 bill 11 ostrich 12 clutch

POSTVIEWING ACTIVITIES

1. Wildlife needs our help—be of service! The National Wildlife Federation and the Audubon Society both have a keen interest in, and respect for, animals. These organizations are examples of businesses that are dedicated to preserving and caring for wildlife.

   The National Wildlife Federation suggests planting a garden filled with various herbs and plants to provide a pleasant resting spot for the neotropical birds when they migrate to this area. These birds will enrich your community not only because of their beauty and song, but because they will help maintain an ecological balance in our urban environment. Consider planting a garden in your schoolyard or backyard as a public service to these valuable creatures.

   Plant a wide variety of fruiting and flowering plants, plants that blossom or bear fruit from early spring to late fall. Berries provide carbohydrates and fats, particularly in the late summer and fall. Perennials and annuals are planted to provide nectar for hummingbirds. Hummingbirds visit the cardinal flower and pineapple sage. Always include plants that attract insects. Rotting wood as well as oaks, hickories, and maples are excellent choices. Native plants are wonderful to plant. They offer the best overall food sources, and the neotropical migrants will spread their seeds.

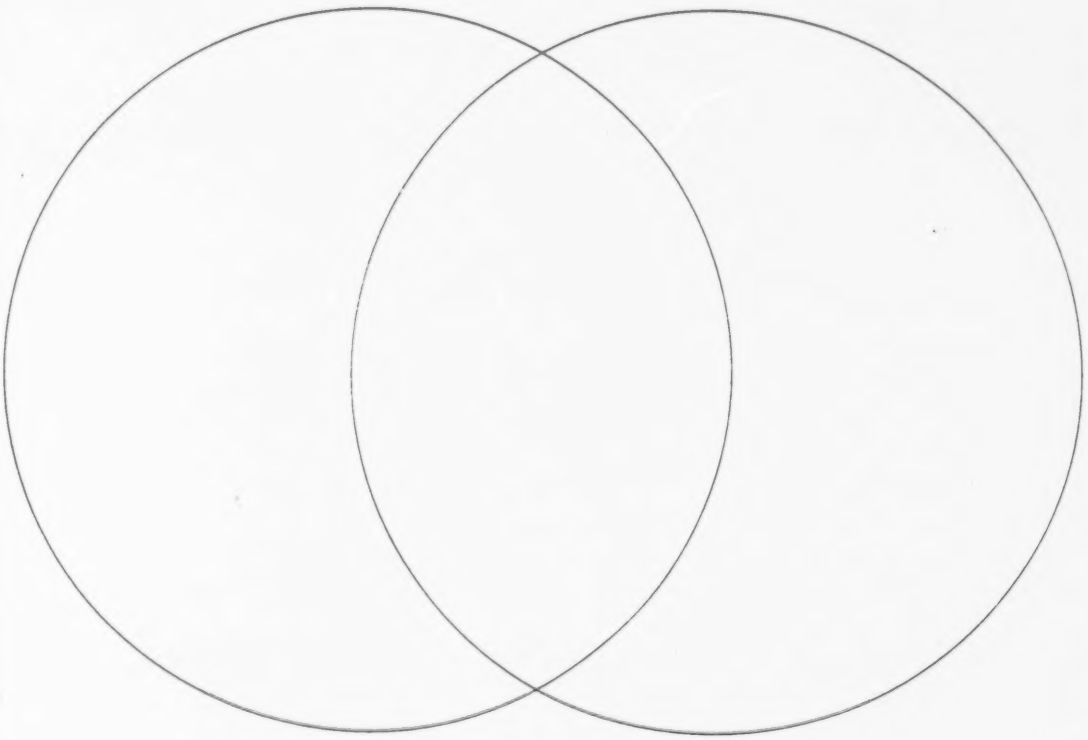
2. Humans benefit from the migration of these diverse birds into our environment not only because they add to the beauty of our region but because the birds eat the insects that would otherwise be free to consume and damage our forests and parks. Because of this "hidden" benefit, some call migrating birds our unsung heroes.

   People can be unsung heroes too. You have them in your community. Pick someone that you feel has shared his or her unique talents, gifts, time, or culture with neighbors, friends, family, or community. Write a short paragraph about this person to share with your class. These unsung heroes need not be famous, popular, wealthy, or extremely talented. Unsung heroes are often people who help you or others to in the community or who make a community a more pleasant place to live. You may want to invite these unsung heroes to your classroom for a celebration. You may wish to read your paragraph out loud and present your guest with a personally designed certificate of merit.

3. Ask students to keep a "Birds in My Neighborhood" journal. The journal should include information about behavior, habitat, and structure. Students may include photographs or illustrations.

4. Direct students to discuss the following questions:
   a. How are birds and reptiles similar? (legs are covered with scales, toes have claws, beaks are horny and toothless, eggs are protected by a shell).
   b. What roles do birds play in the environment? What might happen if there were no birds?
5. Direct students to research how the shape of an airplane's wing imitates a bird's wing.
6. Ask students to list ways we use birds and bird products.
7. Allow students to debate the pros and cons of the bald eagle as a good national emblem.
8. Direct students to research the advantages and disadvantages of being warmblooded.
9. Divide students into teams. Direct each team to design a flying machine using any material available. Hold a competition to see which team's machine remains aloft the longest or flies the farthest.
10. Distribute the students' KWL charts. Ask students to complete the third column "What I Learned." Ask students to answer to the following questions:
    a. Were the questions that the students had about birds before the show answered?
    b. What questions do the students still have about birds?
    c. What information about birds did they find particularly unusual or surprising?
11. Students can create a bird flip book showing a favorite bird's movement. Each page should show a small increment in movement so that as each page is flipped to the next one the viewer observes the bird moving.
12. Ask students to research your state's bird. Find out about the bird itself, why it was selected as the state bird, and the process for selection.
13. Direct students to research two birds and use a Venn diagram to compare and contrast the characteristics of the two birds. (see example on page 20).
14. Hold a fair for parents and the school community at which students present songs, poems, skits, and artwork to share what they have learned about birds.
15. Direct students to write to local wildlife agencies for information on bird habitats in your area. Students can design and build a schoolyard bird habitat. Enlist parents and local businesses for assistance.

VENN DIAGRAM



HAWK EAGLE

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RESEARCH PROJECTS

The following research projects are sponsored by the Cornell Lab of Ornithology. For detailed information contact:

Cornell Laboratory of Ornithology
159 Sapsucker Woods Road
Ithaca, NY 14850-1999
607-254-2414 (Project FeedWatcher)
Cost: $14.00/class

800-843-BIRD (Seed Preference Test)
Cost: $7.00/class

Project Feeder Watch

This project is designed to determine whether bird populations are growing or declining across the North American continent. Following are the procedures for this project:

1. Homemade or commercially produced bird feeders are placed outside the classroom window near trees or bushes.
2. Students watch the birds that come to the feeder from November through March (at least once every two weeks). Students need binoculars, paper and pencil, and a field guide to identify and to record the birds they see.
3. Students count the kinds and numbers of birds that come to the feeder.
4. Information is recorded on forms provided by the Cornell Lab of Ornithology. The forms are sent to the Cornell Lab of Ornithology in the spring.

National Science Experiment—Seed Preference Test

This project is designed to discover what kinds of seeds ground-feeding birds prefer, by region and time of year. This continentwide study is the first of its kind. Following are the procedures for this project:

1. Between November and April, classes set up three pieces of cardboard on the school grounds where birds are accustomed to come for food. One type of bird seed is placed on each piece of cardboard.
2. Students record the kinds and numbers of birds that choose each type of seed during a series of 5-minute watches.

RESOURCES

For information about birds that are indigenous to your area contact your local Audubon Society, museums, state and local park systems, zoos, county cooperative extension services, local hatcheries and poultry breeders, or nature centers.

The following organizations and companies have resource materials and products available on birds:

Carolina Biological Supply Company
2700 York Road
Burlington, NC 27215

National Audubon Society
National Capital Office
666 Pennsylvania Avenue SW
Washington, DC 20003

National Geographic Society
Educational Services, Dept. 89
Washington, DC 20036

National Wildlife Federation
1400 16th Street NW
Washington, DC 20036-2266
(Ranger Rick's NatureScope is a terrific resource for classroom activities. (For this program, we suggest Birds, Birds, Birds!)

Smithsonian Migratory Bird Center
National Zoological Park
Washington, DC 20008

The Wildlife Center of Virginia
P.O. Box 98
Weyers Cave, VA 24486

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